

## **REMARKS**

Applicants' representative (Matthew H. Szalach; Reg. No. 53,665) would like to thank Examiner Fidler for the courtesies extended during an interview conducted on June 12, 2008. During the interview, the Examiner clarified his Response to Arguments set forth in the Office Action mailed April 1, 2008. Specifically, the Examiner indicated that the presently pending language of independent Claims 1 and 16 does not preclude a normal drive signal and a cooling drive signal to be derived from the same signal. Arguments were presented to the Examiner that the drive signal disclosed by Kimura (U.S. Patent No. 6,386,672) relies on adjustment of a single signal rather than two discrete signals. While the Examiner was somewhat receptive to this argument, the Examiner suggested amending independent Claims 1 and 16 to distinguish over Kimura. Specifically, the Examiner suggested focusing on the disclosure of Paragraphs [0064] and [0065] and Figures 5A and 5B. No exhibits were shown or demonstrations conducted.

Claims 1-6, 8-13, 16-28, 33-35, and 37-41 are now pending in the application. By this paper, Claims 1 and 16 have been amended and Claims 37-41 have been added. The basis for the foregoing amendments and new claims can be found throughout the specification, claims, and drawings originally filed. No new matter has been added. The preceding amendments and the following remarks are believed to be fully responsive to the outstanding Office Action and are believed to place the application in condition for allowance. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

#### **REJECTION UNDER 35 U.S.C. § 112**

Claims 1 and 16 stand rejected under 35 U.S.C. § 112, first paragraph, for failing to comply with the written description requirement. Specifically, the Examiner asserts that selecting a cooling drive signal following each period of normal discharge is not disclosed by the application, as filed. This rejection is respectfully traversed.

Applicants respectfully submit that the amendments to independent Claims 1 and 16 render the above rejection moot. Accordingly, reconsideration and withdrawal of the rejections are respectfully requested.

#### **REJECTION UNDER 35 U.S.C. § 103**

Claims 1, 2, 5, 8, 16, 17, 20, 23, and 33-35 stand rejected under 35 U.S.C. § 103(a) as being anticipated by Kimura et al. (U.S. Pat. No. 6,386,672) in view of Fukuda et al. (U.S. Pat. No. 5,066,964).

Claims 3 and 18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kimura et al. as modified by Fukuda et al., as applied to Claims 1 and 16 above, and further in view of Kubo (U.S. Pat. No. 6,257,688).

Claims 4 and 19 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kimura et al. as modified by Fukuda et al., as applied to Claims 1 and 16 above, and further in view of Tajika (U.S. Pat. No. 5,861,895).

Claims 6 and 21 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kimura et al. as modified by Fukuda et al., as applied to Claims 1 and 16 above, and further in view of Nozawa (U.S. Pat. No. 6,499,821).

Claims 9, 11-13, 24, and 26-28 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kimura et al. as modified by Fukuda et al., as applied to Claims 1 and 16 above, and further in view of Usui et al. (U.S. Pat. No. 6,981,761).

Claims 10 and 25 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kimura et al. as modified by Fukuda et al., as applied to Claims 1 and 16 above, and further in view of Shinoura (U.S. Pat. No. 6,714,173).

These rejections are respectfully traversed.

Independent Claim 1 recites a droplet discharge apparatus including means for discharging a discharge liquid in the form of droplets through an aperture by mechanically deforming a piezoelectric element by a normal drive signal, a drive integrated circuit disposed adjacent to and in thermal contact with the piezoelectric element, and a control unit that selects between the normal drive signal and a cooling drive signal and supplies the selected normal drive signal or cooling drive signal to the drive integrated circuit. The normal drive signal includes a waveform having a steeper rising slope, a steeper falling slope, and a shorter folding time than the cooling drive signal. A substrate is attached to and is in thermal contact with the piezoelectric element and the drive integrated circuit, a diaphragm is disposed adjacent to and is in thermal contact with the piezoelectric element, and a temperature sensor is associated with the drive integrated circuit for sensing a temperature of the drive integrated circuit. Independent Claim 1 further recites that the sensed temperature of the drive integrated circuit reflects an operating heat of the piezoelectric element due to the piezoelectric element being thermally coupled to the drive integrated circuit via the substrate. The sensed temperature of the drive integrated circuit reflects the temperature of the

discharge liquid due to the thermal connection of the discharge liquid, the diaphragm, the piezoelectric element, the substrate, and the drive integrated circuit. The control unit selects between the normal drive signal and the cooling drive signal based on the temperature of the discharge liquid and the droplets are discharged from the aperture based on the selected normal drive signal or cooling drive signal. A flushing process is implemented between cycles of normal discharge to set the temperature of the discharge liquid to a predetermined temperature. The flushing process includes selecting the cooling drive signal following periods of normal discharge to set the temperature of the discharge liquid to a predetermined temperature prior to initiating a subsequent normal discharge.

Independent Claim 16 recites a droplet discharging method including sensing a temperature of a drive integrated circuit disposed adjacent to and in thermal contact with a piezoelectric element and determining a temperature of a discharge liquid disposed adjacent to the piezoelectric element based on the detected temperature of the drive integrated circuit. Independent Claim 16 further recites selecting between a normal drive signal and a cooling drive signal based on the temperature of the discharge liquid, discharging the discharge liquid in the form of droplets through an aperture by mechanically deforming the piezoelectric element based on the selected normal drive signal or cooling drive signal, and selecting the cooling drive signal during a flushing process following periods of normal discharge of the discharge liquid. The discharge liquid is discharged by mechanically deforming the piezoelectric element based on the cooling drive signal during the flushing process to cool the discharge liquid prior to subsequent normal discharge and the normal drive signal is selected following

the flushing process. Selecting the normal drive signal includes generating a waveform having a steeper rising slope, a steeper falling slope, and a shorter holding time than the cooling drive signal.

As discussed during the interview of June 12, 2008, Applicants respectfully submit that Kimura fails to disclose a droplet discharging apparatus or method including a control unit that selects between a normal drive signal and a cooling drive signal based on a sensed temperature of a drive integrated circuit, as Kimura fails to disclose selecting between a *pair* of signals. Applicants also submit that Kimura fails to disclose a normal drive signal including a waveform having a steeper rising slope, a steeper falling slope, and a shorter holding time than a cooling drive signal.

Kimura discloses an inkjet recording head including a nozzle plate (3), a flow path forming substrate (7), a piezoelectric vibrator unit (8), and an elastic plate (10) that are controlled based on a detected temperature of a semiconductor substrate (67). See Kimura at Col. 8, Ins. 5-13. Kimura discloses adjusting a level of a single drive signal based on a detected temperature of the substrate (67) and, therefore, fails to disclose selecting between a pair of signals. See Kimura at Col. 8, Ins. 5-13 and Ins. 40-57. Because Kimura fails to disclose a *pair* of signals, Applicants respectfully submit that Kimura fails to disclose a normal drive signal and a cooling drive signal – much less a normal drive signal including a waveform having a steeper rising slope, a steeper falling slope, and a shorter holding time than that of a cooling drive signal.

In light of the foregoing, Applicants respectfully submit that independent Claims 1 and 16, as well as Claims 2-6, 8-13, 17-28, and 33-35, respectfully dependent

therefrom, are in condition for allowance. Accordingly, reconsideration and withdrawal of the rejections are respectfully requested.

#### **NEW CLAIMS**

New Claims 37-41 are added for consideration. Because new Claims 37-41 respectively depend from independent Claims 1 and 16, which are believed to be in condition for allowance in light of the foregoing remarks, Applicants respectfully submit that new Claims 37-41 are similarly in condition for allowance.

#### **CONCLUSION**

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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